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EXAMINER

WEINER, L

ART UNIT

PAPER NUMBER

1745

DATE MAILED:

03/24/00

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

# Office Action Summary

Application No.  
**09/162,992**

Applicant(s)  
**Senoo et al.**

Examiner  
**Laura W in r**

Group Art Unit  
**1745**



☒ Responsive to communication(s) filed on Sep 30, 1998

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1035 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claim

☒ Claim(s) 1-10 is/are pending in the application

Of the above, claim(s) none is/are withdrawn from consideration

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 1-10 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some\* ☐ None of the CERTIFIED copies of the priority documents have been  
☒ received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

☐ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 2

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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## DETAILED ACTION

### *Specification*

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### *Claim Rejections - 35 USC § 112*

2. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 is rejected because it is unclear what is meant by 5.95 in "molar ratio ... is 5.95 to 30:70".

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-5, 7-9 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious Akashi (EP 0 724 305 A1).

Akashi teaches on page 3, lines 23-37, a gel electrolyte which has a polymer having a side chain to which at least one nitrile group is bonded and a cell produced by using such a fire-retardant gel electrolyte. Akashi teaches on page 5, lines 29-35, a fire-retardant gel electrolyte was prepared using polyacrylonitrile, ethylene carbonate and propylene carbonate weighed respectively in such amounts represented by Tables 1 and 2 and then added a LiPF<sub>6</sub> solution having a molar concentration of 1.0M. Akashi teaches on page 5, lines 12-16, that suitable negative electrode materials may include a carbonaceous material such as graphite, etc. Akashi teaches on page 5, lines 8-11, that the positive electrode may include a lithium/transition metal composite oxide.

With respect to the product by process of the negative electrode, the determination of patentability is based upon the product itself not upon the method of its production. *In re Thrope* 227 USPQ 964; *In re Brown* 173 USPQ 685; *In re Bridgeford* 149 USPQ 55; *In re*

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*Wertheim 191 USPQ 90.* Any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the Examiner has found a substantially similar product as in the applied prior art, the burden of proof is shifted to the Applicants to establish that their product is patentably distinct. *In re Brown 173 USPQ 685 and In re Fessmann 180 USPQ 324.*

6. Claims 1, 8-9 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakane et al. (EP 0 845 824 A1).

Nakane et al. teaches in column 6, lines 11-27, an anode of the lithium secondary battery includes carbonaceous materials such as natural graphite, artificial graphite, cokes, carbon black, etc. Nakane et al. teaches in column 5, lines 28-34, that the cathode includes an active material. Nakane et al. teaches in column 8, lines 19-21, that also usable is a so-called gel-type electrolyte in which a nonaqueous liquid electrolyte is maintained by a polymer.

With respect to the product by process of the negative electrode, the determination of patentability is based upon the product itself not upon the method of its production. *In re Thrope 227 USPQ 964; In re Brown 173 USPQ 685; In re Bridgeford 149 USPQ 55; In re Wertheim 191 USPQ 90.* Any difference imparted by the product by process limitations would have been obvious to one having ordinary skill in the art at the time the invention was made because where the Examiner has found a substantially similar product as in the applied

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prior art, the burden of proof is shifted to the Applicants to establish that their product is patentably distinct. *In re Brown* 173 USPQ 685 and *In re Fessmann* 180 USPQ 324.

7. Claims 1-5, 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akashi (EP 0 724 305 A1) in view of Ozaki et al. (5,522,127).

Akashi teaches the claimed invention except does not specifically teach that the negative electrode material is obtained by firing meso-carbon micro beads and does not specifically teach that the specific surface area of the carbonaceous material is 0.1 to 10 m<sup>2</sup>/g.

Ozaki et al. teaches in column 3, lines 26-67 and line 4, lines 5-14, that fabrication of the negative electrode plate which by using the mesophase graphite particles obtained by the processes described which was carbonized at 1000 degrees C and further graphitized at 2800 degrees C was mixed with styrene butadiene rubber. Ozaki et al. teaches that the specific surface area ranges from 3.2 m<sup>2</sup>/g to 3.4 m<sup>2</sup>/g. Ozaki et al. teaches in column 3, lines 8-14, that the negative electrode formed by carbonizing, and graphitizing leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

In the event any differences can be shown for the product of the product by process, as opposed to the product taught by Akashi, such differences would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results. Furthermore, it would have been obvious to one of ordinary skill in the art to make the graphitized carbonaceous material by the process taught by Ozaki et al. and obtain the

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claimed specific surface area of the carbonaceous material because Ozaki et al. teaches that this leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

8. Claims 1, 5-6, 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (EP 0 845 824 A1) in view of Ozaki et al. (5,522,127).

Nakane et al. teaches in column 6, lines 11-27, an anode of the lithium secondary battery includes carbonaceous materials such as natural graphite, artificial graphite, cokes, carbon black, etc. Nakane et al. teaches in column 5, lines 28-34, that the cathode includes lithiated nickel dioxide containing aluminum. Nakane et al. teaches in column 8, lines 19-21, that also usable is a so-called gel-type electrolyte in which a nonaqueous liquid electrolyte is maintained by a polymer. Nakane et al. teaches in column 7, lines 30-59, that organic solvents usable include carbonates such as propylene carbonate, ethylene carbonate, dimethyl carbonate, ethyl methyl carbonate, etc.; esters such as gamma-butyrolactone, etc. Normally, two or more compounds of the above are used in combination. Above all, a mixed solvent containing a carbonate is preferred and more preferred is a mixed solvent of a cyclic carbonate and a non-cyclic carbonate. Nakane et al. teaches in column 7, lines 20-29, that it is preferred to use at least one of the salts containing fluorine or at least one salt selected from a group consisting of LiPF<sub>6</sub>, LiBF<sub>4</sub>, LiCF<sub>3</sub>SO<sub>3</sub>, etc. Nakane et al. teaches in column 9, lines 25-27, that the mixed solution LiPF<sub>6</sub> was dissolved in a concentration of 1 mol/l of the mixed solvent.

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Nakane et al. teaches the claimed invention except does not specifically teach that the negative electrode material is obtained by firing meso-carbon micro beads, does not teach that the specific surface area of the carbonaceous material is 0.1 to 10 m<sup>2</sup>/g and does not teach that the propylene carbonate has a proportion of 10-75 mol%.

Ozaki et al. teaches in column 3, lines 26-67 and line 4, lines 5-14, that fabrication of the negative electrode plate which by using the mesophase graphite particles obtained by the processes described which was carbonized at 1000 degrees C and further graphitized at 2800 degrees C was mixed with styrene butadiene rubber. Ozaki et al. teaches that the specific surface area ranges from 3.2 m<sup>2</sup>/g to 3.4 m<sup>2</sup>/g. Ozaki et al. teaches in column 3, lines 8-14, that the negative electrode formed by carbonizing, and graphitizing leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.

In the event any differences can be shown for the product of the product by process, as opposed to the product taught by Nakane et al., such differences would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results. Furthermore, it would have been obvious to one of ordinary skill in the art to make the graphitized carbonaceous material by the process taught by Ozaki et al. and obtain the claimed specific surface area of the carbonaceous material because Ozaki et al. teaches that this leads to a smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity.



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It would have been obvious to one having ordinary skill in the art at the time the invention was made to use between 10-75 mol% of propylene carbonate, since it has been held that where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

9. Claims 2-4, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakane et al. (EP 0 845 824 A1) in view of Ozaki et al. (5,522,127) and further in view of Chua et al. (5,240,790) or Abraham et al. (5,219,679).

Nakane et al. teaches the claimed invention as taught above teaching having a gelled electrolyte but does not teach that the gel electrolyte includes a high-molecular material having a nitrile group in its side chain in which the material is polyacrylonitrile.

Chua et al. teaches a secondary electrochemical cell which includes a solid gelled electrolyte system including an amount of polyacrylonitrile, an amount of solvent and plasticizer that includes gamma-butyrolactone. Chua et al. teaches in column 1, lines 10-16 and column 2, lines 10-55, that utilizing a solid gelled film polymeric electrolyte including polyacrylonitrile in combination with one or more solvent plasticizers together with one or more lithium salts offers operational safety, in addition to high energy density and excellent packaging flexibility. The present invention offers higher conductivity and improved layer interfacial stability. Chua et al. teaches that 12-22 mol% of polyacrylonitrile, 18-36 mol% of gamma-butyrolactone and 33-39 mol% of ethylene carbonate was used.

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Abraham et al. teaches in column 2, lines 1-20, that polymer electrolytes having conductivities greater than  $10^{-3}$  /ohm - cm can be formed between a low lattice energy Li salt such as LiBF<sub>4</sub>, etc and a high dielectric constant aprotic organic solvent mixture of propylene carbonate and ethylene carbonate in a polymer matrix such as polyacrylonitrile.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the gelled film polymeric electrolyte taught by Chua et al. because Chua et al. teaches that a solid gelled film polymeric electrolyte including polyacrylonitrile in combination with one or more solvent plasticizers together with one or more lithium salts offers higher conductivity and improved layer interfacial stability and because one of ordinary skill in the art knows that the difference between being considered just a solid polymer electrolyte versus a gelled polymer electrolyte is the polymer used.

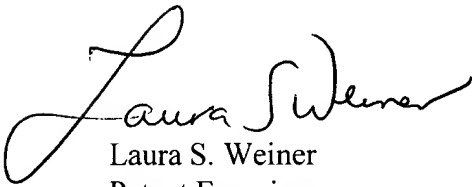
It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the electrolyte taught by Abraham et al. because Abraham et al. teaches that polymer electrolytes having conductivities greater than  $10^{-3}$  /ohm - cm can be formed between a low lattice energy Li salt such as LiBF<sub>4</sub>, etc and a high dielectric constant aprotic organic solvent mixture of propylene carbonate and ethylene carbonate in a polymer matrix such as polyacrylonitrile and because one of ordinary skill in the art knows that the difference between being considered just a solid polymer electrolyte versus a gelled polymer electrolyte is the polymer used.

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10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura Weiner whose telephone number is (703) 308-4396. The examiner can normally be reached on Monday-Friday from 7:30 a.m. to 4:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Maria Nuzzolillo, can be reached on (703) 305-3776. The official fax phone number for the organization where this application or proceeding is assigned is (703) 305-3599.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

A handwritten signature in cursive script that reads "Laura S. Weiner". The signature is written in dark ink and is positioned above the printed name and title.

Laura S. Weiner  
Patent Examiner  
Art Unit 1745  
March 23, 2000